

## **GEOL/PHYS 6670 Geophysical Inverse Theory**

Spring 2006, 2 credits

### **Professor:**

Dr. Anne Sheehan

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Office hours: Tues 4-5, Thurs 9:30-10:30, or by appointment.

**Lectures:** MWF 11-11:50 a.m. ( only 2 days per week, see schedule on reverse), Benson Rm 355

**Course Objectives:** This course will cover the principles of geophysical inverse theory as applied to problems in the Earth Sciences. Both theory and applications will be covered. Inverse theory is a set of mathematical techniques used to obtain inferences about the Earth from physical measurements. The focus of this class will be on formulating and solving inverse problems, and understanding the nonuniqueness and resolution associated with inversions. We will not emphasize matrix inversion techniques, which are well covered in applied mathematics courses.

**Course Format:** The majority of the semester will be in traditional lecture format with homeworks. The first ten minutes of each class period will be devoted to a brief student presentation on an application of inverse theory from a recent published research article. The last 2 weeks of the semester will consist of student presentations.

**Computing:** Many of the assignments will require programming in Matlab.

**Text:** *Parameter Estimation and Inverse Problems*, Aster, Borchers, and Thurber, published by Elsevier (available in CU bookstore)

### **Grading:**

Homeworks	60%
Class presentations	20%
Term paper	20%

## Tentative Lecture Schedule: GEOL/PHYS 6670, Spring 2006

Week	Days	Textbook Chapter	Topics
1. Jan. 16	W only	Ch. 1	Introduction
2. Jan. 23	W, F	Appendix A, B	Linear algebra, Probab
3. Jan. 30	W, F	Ch. 2	Linear regression
4. Feb. 6	W, F	Ch. 2	Least-squares theory, l
5. Feb. 13	W, F	Ch. 3	Discretizing integral eq
6. Feb. 20	M, F	Ch. 4	SVD, covariance, resol
7. Feb. 27	M, F	Ch. 5	Regularization
8. March 6	M, F	Ch. 9, 10	Nonlinear regression
9. March 13	M, W	Ch. 6	Iterative methods
10. March 20	M, W	Ch. 6	Iterative methods
11. March 27	Spring Break		
12. April 3	W, F	Ch. 8	Fourier techniques
13. April 10	M, W	Ch. 11	Bayesian inversion
14. April 17	M, W		Nonlinear inverse prob
15. April 24	M, W		Student presentations
16. May 1	M, W		Student presentations